USING A RISK-BASED, SYSTEMIC APPROACH TO SAFETY ANALYSIS TO PREVENT CRASHES

NJDOT Research Showcase

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Joe Fish, Cambridge Systematics

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AGENDA

Overview of systemic approach to safety

Systemic Safety Project Selection Tool

Case Studies

- **Utah**
- **Ohio/Mid-Ohio Regional Planning Commission**

Potential Application to New Jersey

OVERVIEW OF SYSTEMIC SAFETY APPROACH

THE CHALLENGE

54% of fatal crashes are in rural areas

- 12% in NJ
- 53% in PA
- 53% in NY

Rural roads spread out over wide area

- Low density of crashes > seemingly random locations

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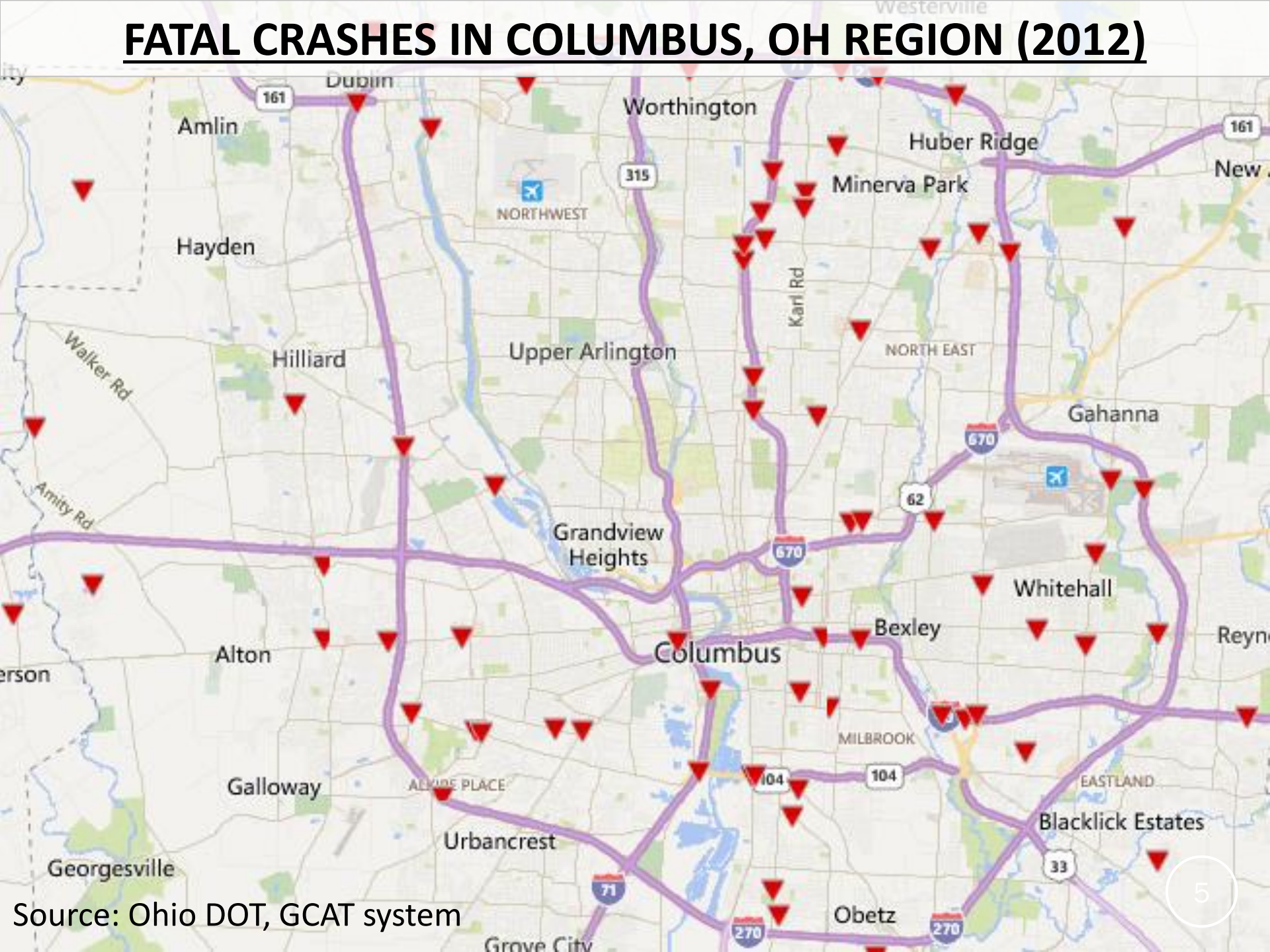
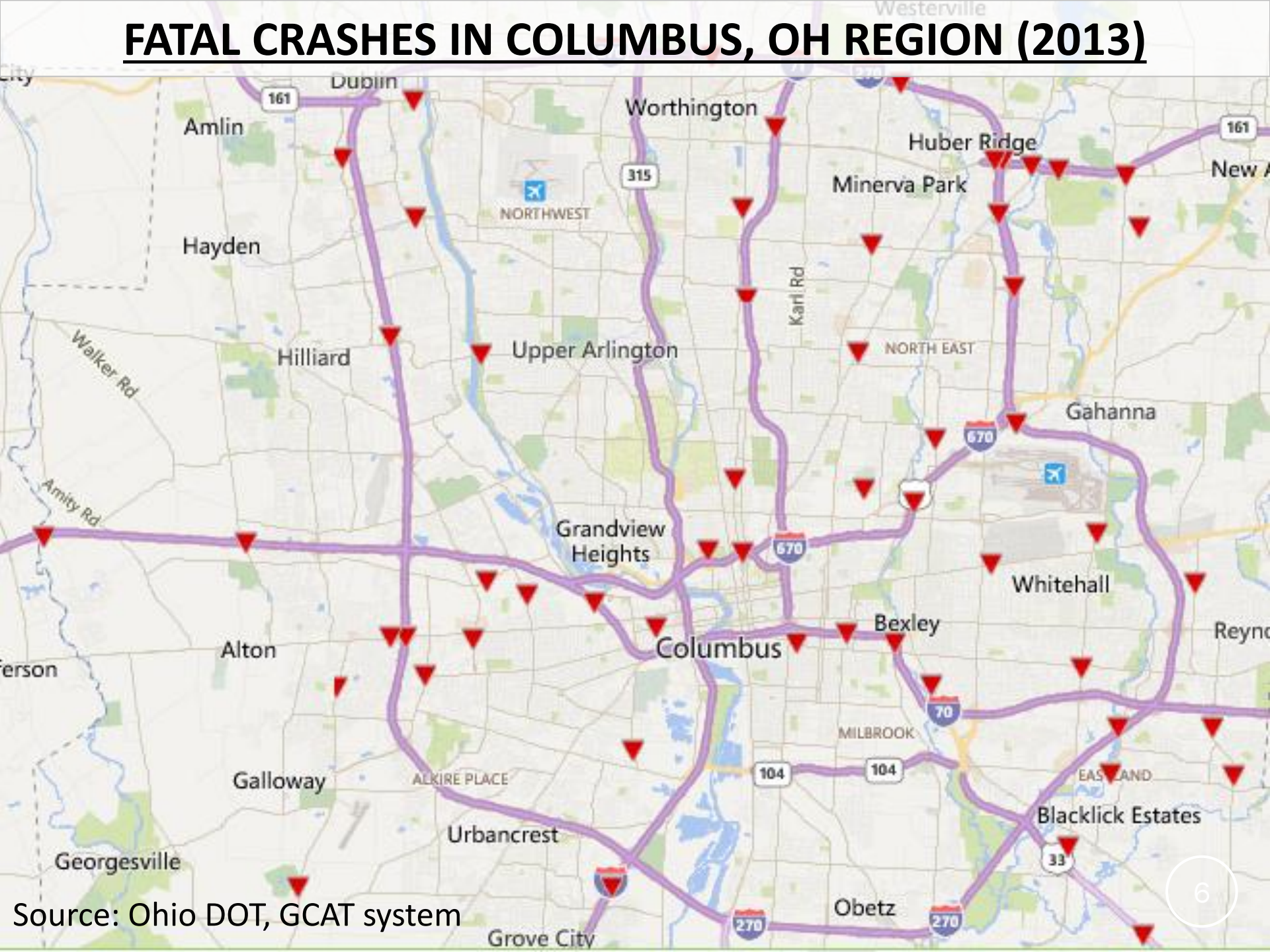
FATAL CRASHES IN COLUMBUS, OH REGION (2012)



Source: Ohio DOT, GCAT system

FATAL CRASHES IN COLUMBUS, OH REGION (2013)



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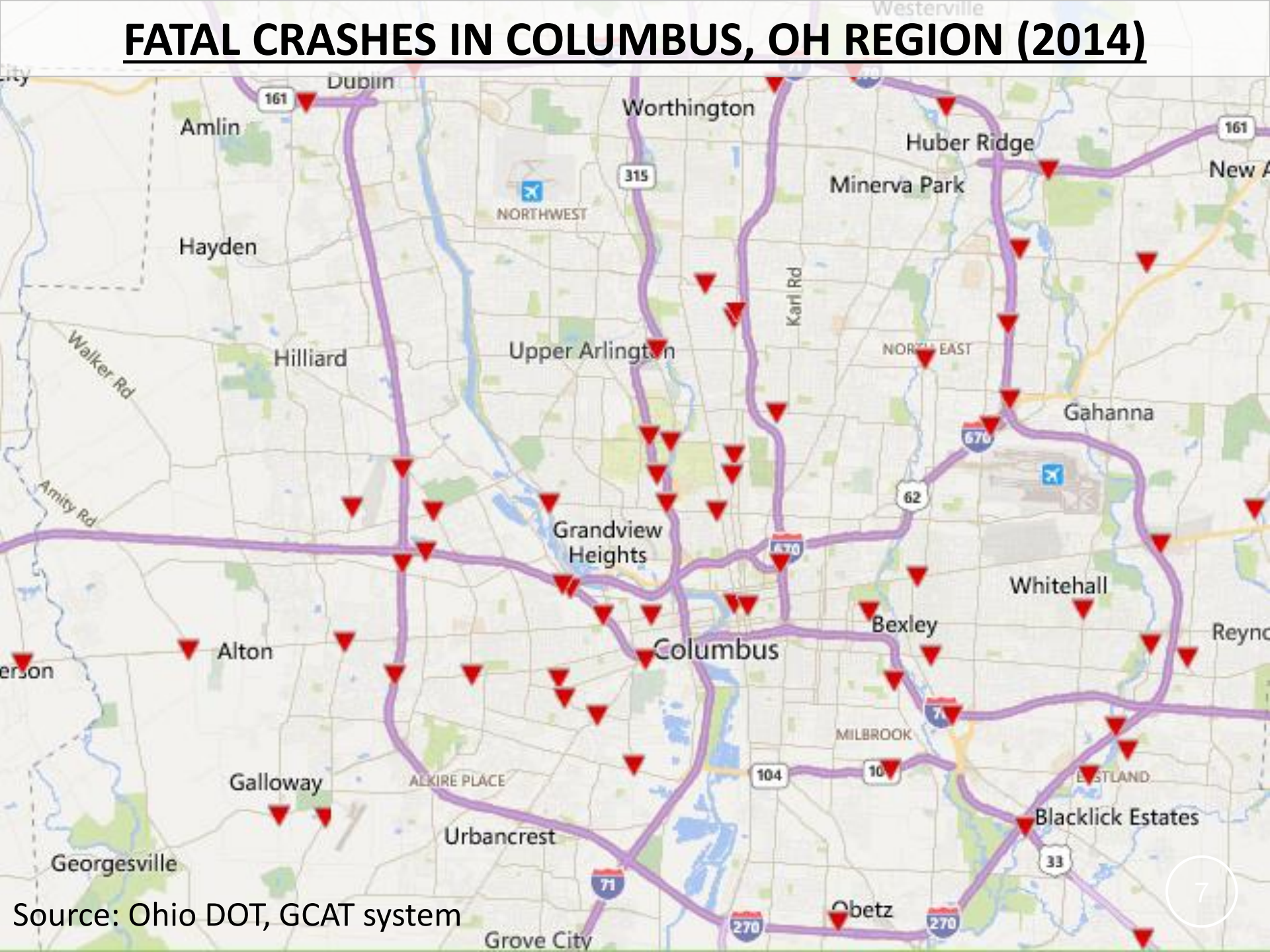
FATAL CRASHES IN COLUMBUS, OH REGION (2014)



Source: Ohio DOT, GCAT system

CONSISTENCY OF CRASH TYPES

% of Fatal and Incapacitating Injuries by Crash Type

Year	Angle	Fixed Object	Pedestrian	Rear-End
2006	21%	23%	12%	14%
2007	19%	23%	12%	14%
2008	23%	21%	13%	10%
2009	19%	21%	11%	12%
2010	20%	22%	13%	11%

Source: Mid-Ohio Regional Planning Commission

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WHAT IS A SYSTEMIC SAFETY IMPROVEMENT?

An improvement that is widely implemented based on high-risk roadway features that are correlated with particular severe crash types.

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WHAT DO WE MEAN BY "RISK"?

The potential for a specific type of severe crash to occur at a specific location because of the location's characteristics or features.

> > Severe crash locations are not random <<

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BENEFITS OF A SYSTEMIC APPROACH

- Increases potential to reduce severe crashes
- High benefit to cost ratio
- Proactively identify safety improvements
- Complementary to site analysis approach
- Greater understanding of severe crashes, including contributing factors and location characteristics
- Good stewardship of public roads

FHWA SYSTEMIC SAFETY PROJECT SELECTION TOOL

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Source: FHWA. Systemic Safety Project Selection Tool. 2013.

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SYSTEMIC SAFETY PLANNING PROCESS

Element 1

Source: FHWA. Systemic Safety Project Selection Tool. 2013.

DATA NEEDS & SOURCES

Crash data

- State or local database
- FARS

Roadway data

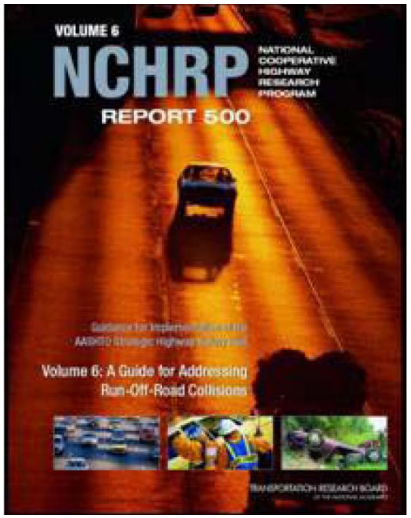
- Video logs
- Online aerial imagery
- Windshield surveys

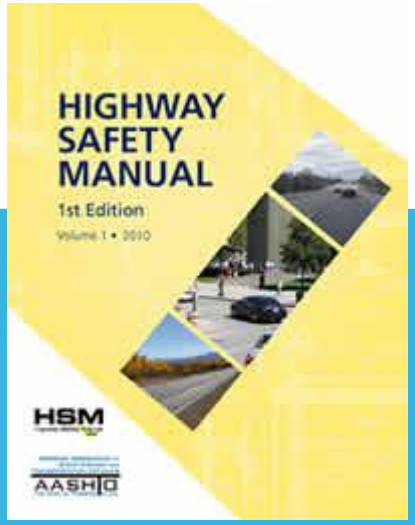
Exposure data

- AADT
- Modeled volume data

COUNTERMEASURE RESOURCES

- NCHRP Report 500 Series
- Crash Modification Factors Clearinghouse
- Highway Safety Manual
- Strategic Highway Safety Plan
- Intersection Safety Plans
- Roadway Departure Improvement Plans
- FHWA's illustrated guide sheets and proven countermeasures
- NHTSA's Countermeasures That Work
- Agency experience / engineering judgment





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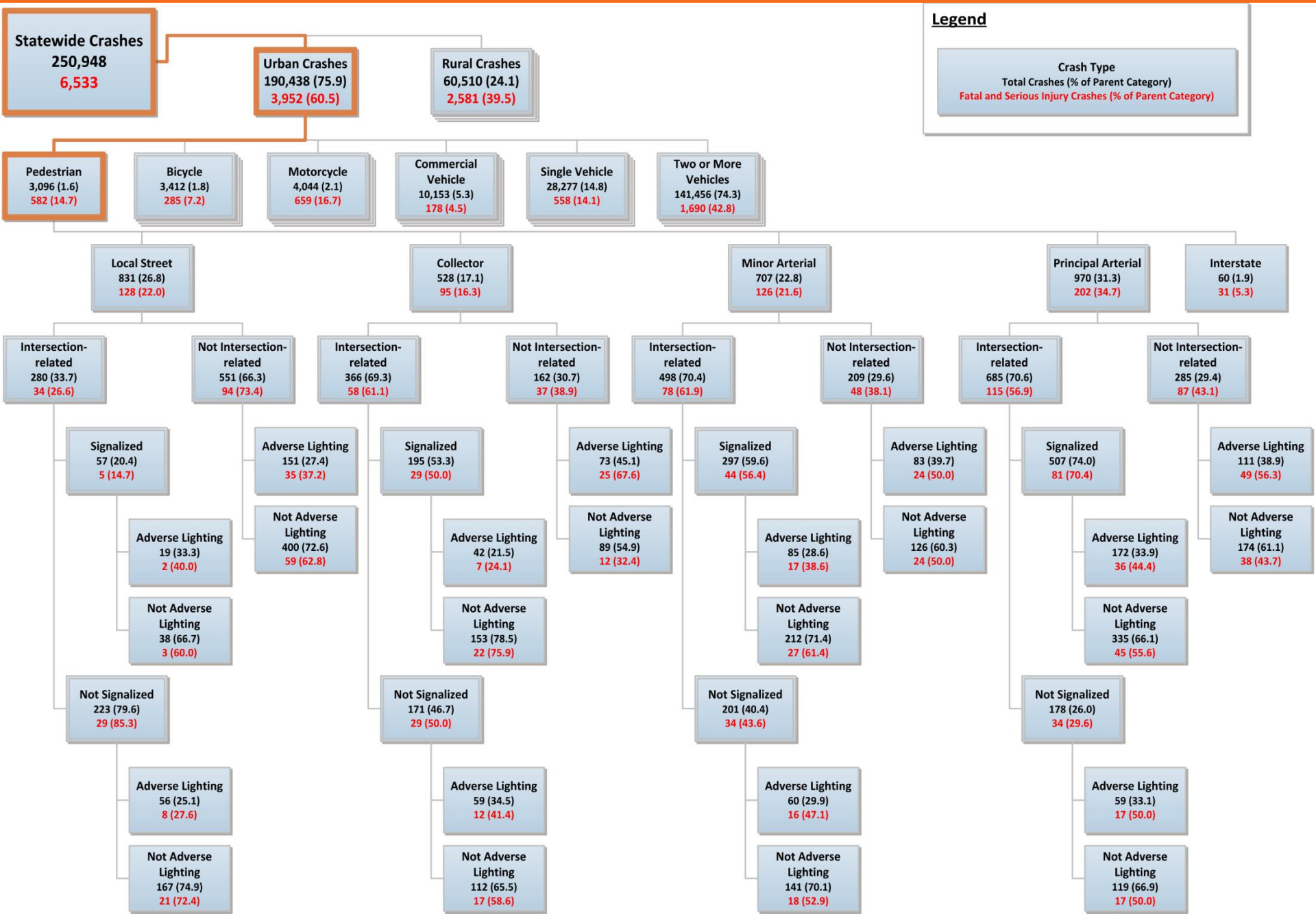
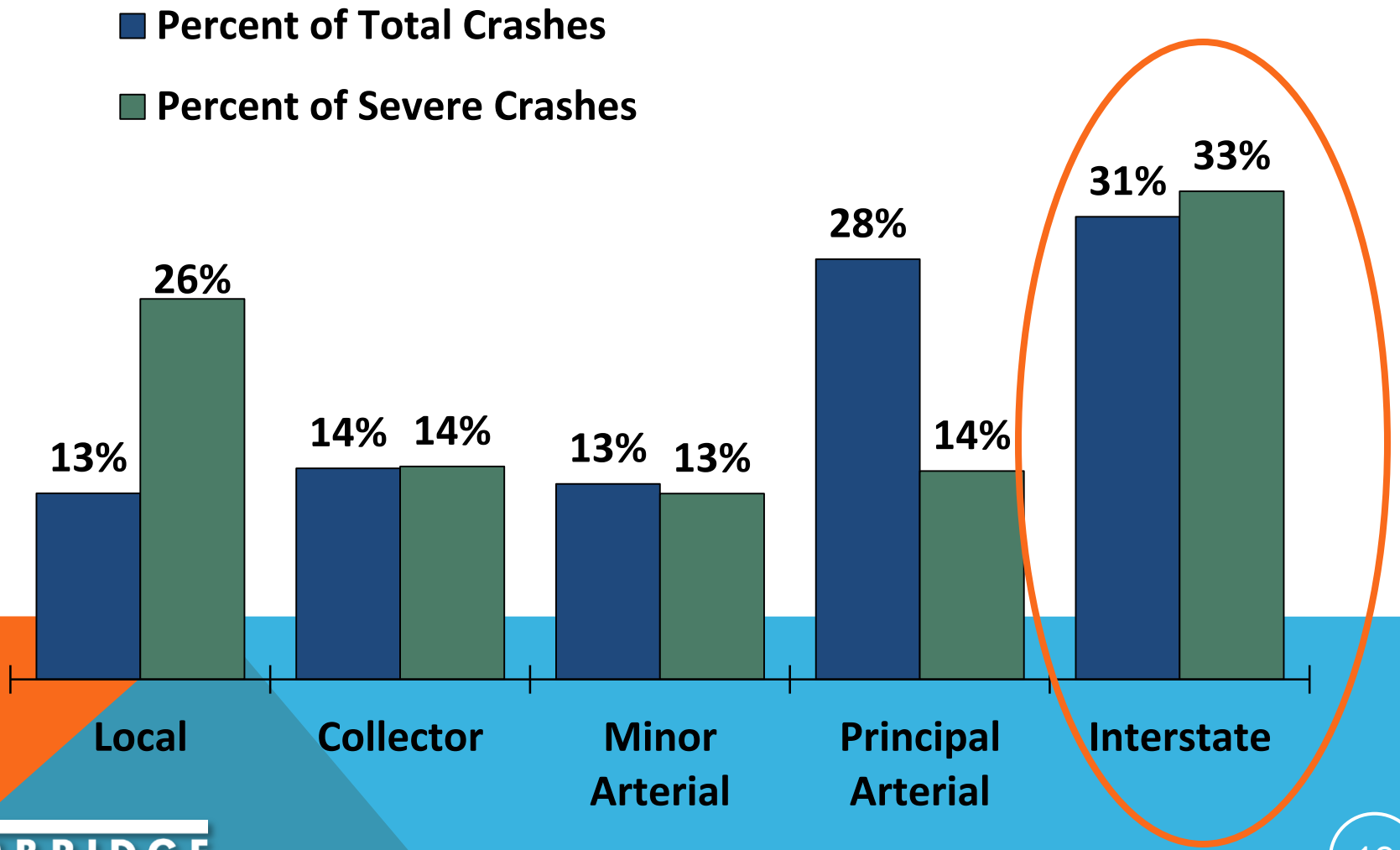
CASE STUDY: UTAH SYSTEMIC SAFETY ANALYSIS

PEDESTRIAN CRASHES IN URBAN AREAS (2008-2012)



CRASH TYPE & RISK FACTOR IDENTIFICATION

Rural, single-vehicle crash distribution by roadway functional class



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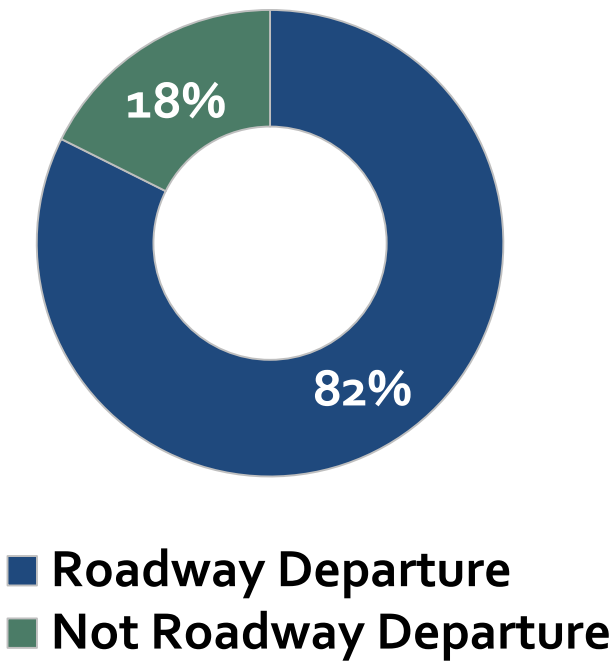
CRASH TYPE & RISK FACTOR IDENTIFICATION

Single-vehicle crashes on rural interstates



		Event 2			Total
		Fixed Object	Rollover	Other	
Event 1	Off Left	4%	31%	6%	41%
	Off Right	4%	17%	7%	28%
	Other	4%	19%	8%	32%
Total		12%	67%	21%	100%

CRASH TYPE & RISK FACTOR IDENTIFICATION

Single-vehicle RD crashes on rural interstates

	Positive Median Barrier		Unprotected (Painted Median)		None/Unknown Median	
	Total Crashes	Severe Crashes	Total Crashes	Severe Crashes	Total Crashes	Severe Crashes
Local	1%	0%	2%	1%	97%	99%
Collector	1%	1%	2%	2%	97%	97%
Minor Arterial	1%	0%	4%	3%	95%	97%
Principal Arterial	16%	7%	12%	13%	71%	80%
Interstate	42%	21%	44%	69%	13%	10%
All Crashes	20%	8%	21%	28%	59%	64%

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CASE STUDY: MORPC SYSTEMIC SAFETY IMPROVEMENT PROJECT

MORPC'S SYSTEMIC SAFETY PROJECT

- $2M project funded by Ohio DOT w/ local contribution
- Target crash types identified through data analysis at regional level
- Consultation and partnership w/ Ohio DOT
- Pilot project approach > template for other MPOs in Ohio
- Less data-intensive, emphasis on low-cost countermeasures already being implemented in the state.

MORPC'S SYSTEMIC SAFETY PROJECT

Phase 1: Intersection Crashes (focus on angle crashes)

- Selected locations based on crash history and context (not based solely on risk factors): rural stop-controlled > lots of locations, crash history is useful
- Signal backplates > locations based on feasibility of installation

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MORPC'S SYSTEMIC SAFETY PROJECT

Phase 2: Pedestrian Crashes

- Treatments chosen based on existing countermeasures - countdown timers, high-visibility crosswalks, RRFBs
- Local agencies submit candidate locations

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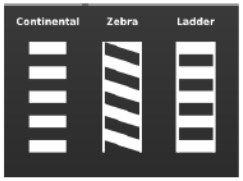
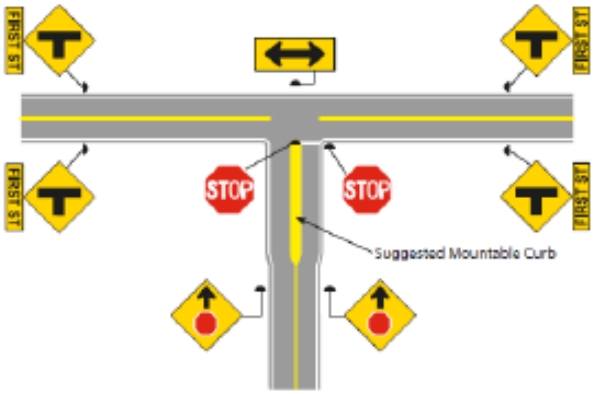
MORPC'S SYSTEMIC SAFETY PROJECT





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IDEAS FOR SYSTEMIC IMPROVEMENTS IN NEW JERSEY

- 88% of fatal crashes are in urban areas
- 27% of fatalities are pedestrians (compared to 14% of U.S. total)
- Routes with high crash rate
- 2 or 4 lane roads without shoulder
- 4 lane roads without median

QUESTIONS?

Joe Fish

Cambridge Systematics

jfish@camsys.com

Beth Wemple

Cambridge Systematics

bwemple@camsys.com

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